Marine Physical Laboratory

Near Bottom Data Collection and Data Analysis

W. S. Hodgkiss

Final Report to the
Office of Naval Research
Contract N00014-89-D-0142 (DO#14)
for the Period 07-01-90 - 03-30-92

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Abstract

The objective of this program was to assist NOSC in the preparations required to conduct a VLF noise and signal experiment in FY93.

Project Summary

Little experimental data exists which can be applied to the design and performance evaluation of of multidimensional array systems. Such data are needed both to validate signal and noise propagation models as well as to provide well-documented real data inputs to new adaptive spatial and temporal processing algorithms.

The experiment to be conducted in FY93 will provide a multidimensional array data set along with detailed environmental data including water column sound speed structure and geoacoustic characterization of the bottom. Preparations for the FY93 experiment have involved several efforts.

First, MPL has assisted NOSC in planning the FY93 experiment. This has included planning the shipboard handling of several array nodes, telemetry between nodes, and telemetry between the seafloor and ship.

Second, in order to obtain an example of near-seafloor vertical array data, the NOBS (noise on basalt and sediment) experiment was augmented with 48 hydrophone array elements providing data on ambient noise and signal structure from the sea floor to approximately 750 m above. Analysis of this data is documented in [1].

Third, robust adaptive algorithms have been developed for the processing of multidimensional array data. Uncertainties in the propagation environment (e.g. sound speed structure) can lead to degradations in the performance of adaptive beamformers. Incorporating knowledge of this uncertainty can improve substantially adaptive beamformer performance. One approach to the design of such a robust processor in a matched-field framework is documented in [2].

References

[1] M.T. Hagerty, G.L. D'Spain, and W.S. Hodgkiss, "Preliminary analysis of the FLIP Array Data from the NOBS Experiment," MPL TM-429, Marine Physical Laboratory of the Scripps Institution of Oceanography, San Diego, CA (1992).

[2] J. Krolik, "Matched-field minimum variance beamforming in a random ocean channel," J. Acoust. Soc. Am. 92: 1408-1419 (1992).

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